Soldier Health Initiative – MEDBASE Application

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ABSTRACT

Combat Health Support (CHS) information management forward of the division rear boundary has not significantly changed since World War II. Automated medical information systems have not been developed for incorporation into the current Standard Army Management Information Systems (STAMIS). Paper requisitions, paper reports, chart boards, voice requests, and "stubby pencil" work are the primary tools used by all forward CHS personnel. These manual processes are inadequate to support the medical information and CHS needs of the Force XXI and Army, 2010 and beyond commander. This inadequate support is exacerbated as the battle space continues to expand and non-linear operations, with increased maneuver and operational tempo (OPTEMPO), become the norm. Digital enablers/digital tools are absolutely necessary to maintain a responsive CHS system, and to maintain the low died of wounds (DOW) rates seen over the last several years.
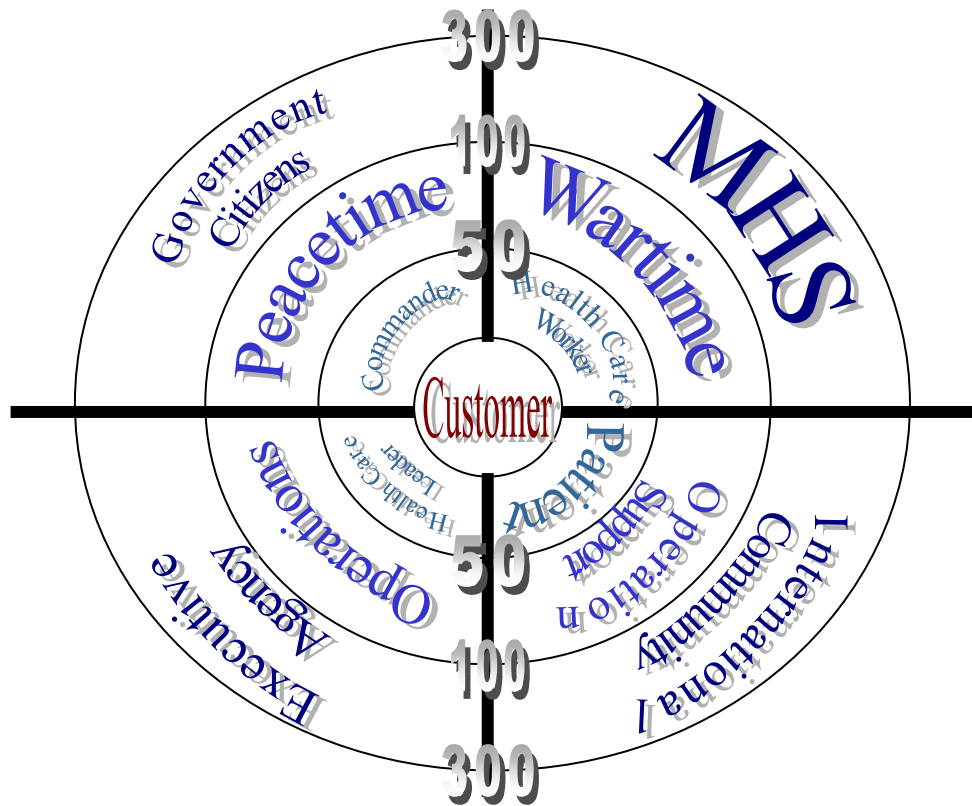
MEDBASE is the Army's interim force enterprise solution for capturing medical readiness data, to include pre- and post- deployment information and in-theatre medical tracking, and for providing medical, situational awareness to commanders. The mission is to provide users the tools necessary to efficiently perform daily business practices across multiple echelons of care and report to commanders relevant medical intelligence as a product of the normal health care practice. It automates and consolidates the entire medical readiness process (pre/post deployment, immunization, disability, medical boards, equipment, exposure etc) and provides a mechanism for tracking the health of a soldier both in garrison and in a field environment. The result is a streamlined approach to soldier medical readiness and the unprecedented collection of clinical data for decision making for commanders at all levels. MEDBASE provides a critical functionality that complements the objective system (CHCS II and CHCS IIT) under development in the TMIP architecture and serves as a bridge system to those areas currently not served by existing corporate systems, primarily those units at division level and below. This system will ensure the full range of medical readiness information is accessible years before the systems in the objective force are fully operational. This enterprise solution allows us to walk on the bridge to the future as we build it. MEDBASE is not a standalone system but works in conjunction with, and is complementary to existing corporate systems and planned MC4 hardware.

1.0 BACKGROUND

The 8 November 97 Presidential Directive specified in Public Law 105-85, National Defense Authorization Act for FY 98 states, in part, that the results of all medical examinations conducted, all health care services (including immunizations) received by service members in anticipation of deployment or during the deployment, and records of events occurring in the deployment area that may affect the health of such members shall be maintained in a centralized location to improve future access to their records. Current manual medical records systems are ineffective and frequently unavailable during deployments. Virtually all of this critical medical information is currently documented on paper, after the fact. These paper records, with their inherent bulk and vulnerability, are easily lost, destroyed, and do not lend themselves to any sort of automated screening. In order to become a part of a soldier's permanent medical record, the pieces of paper must be physically transported back to the soldier's home station and then physically placed in that record. Because of weight and storage limitations, it is impossible to maintain a high level of paper documentation during an operational deployment. Recent examples include Desert Storm, Somalia and Bosnia where immunization and treatment records lacked completeness, reliability and were frequently missing.

There is no existing automated information system to integrate and report critical medical information in support of the warfighting commander. Existing medical information systems are focused mainly on vertical information flow within a stovepipe structure in fixed medical facilities. Commanders do not have access to critical medical information that could assist them in planning operations and making decisions regarding

shaping the battle space and sustaining the force. An automated medical information system is required to link, both horizontally and vertically, the health care provider with diagnostic systems, automated treatment capabilities, evacuation platforms, other health care providers, and warfighter C2 in order to clear the battlefield and report complete situational awareness for the commander. Health care personnel at all echelons must be able to communicate with each other by audio, video, and electronic media to provide the commander with required medical information.


Existing practice for medical readiness is disjointed and primarily paper-based resulting in significant inefficiencies and the inability to capture critical clinical information. Those parts that are automated require multiple entries into separate systems that lack the ability to communicate with each other. MEDBASE serves as the single point for data entry and collection of medical readiness information correcting many of the problems of the existing system. It automates the entire medical readiness portion of the SRP to include pre- and post- deployment as well as the Adult Preventive and Chronic Care Flowsheet that serves as the soldier's medical record during deployments. The application is designed to operate on a network or as a standalone system in the field. Each form required by AR 600-8-101 and corresponding OTSG directives are included in the application. In addition, MEDBASE contains a profile tracking database, a robust immunization tracking database, a CHCS II compliant clinical note, and connectivity to CHCS I, the Military Health System's central clinical data repository, as well as MEDPROS. Because of the program's open architecture, it can be easily adapted to interface with existing and future systems. The program is HIPAA compliant and conforms to DoD 5200.40 and AR 25-1. Additionally, MEDBASE's electronic capture of previously paper forms along with its inclusion of more clinically relevant data fields greatly enhances a commander's ability to leverage medical readiness information for decision making. With this functionality, MEDBASE fills the information vacuum found at the division and below, linking the line to the medical community.

1.0 LITERATURE REVIEW

In regard to the implementation of information systems, there are no guarantees for success. Indeed, a few scholars estimate that between one and two thirds of information systems projects fail and of the financially draining projects, half will be cancelled for failing to meet customers expectations and overshooting the budgets (Rusin & Willimas, 2001).A review of the literature reveals several pitfalls associated with Information System implementation and suggests a number of ways that managers can act in order to successfully implement their programs. Critical success factors for information system implementation can be placed into the following categories: (1) establish a shared vision (2) plan for the entire life cycle, (3) focus on the user, (4) neutralize information system politics (Make sure you get organization buy in), (5) incorporate quality throughout the process, (6) use a team approach, and (7) implement in phases

Establish a shared vision: According to Kiely, 2002; Page, 2000. information systems fail because they aren't aligned with the organizational objectives. Page (200) asserts that critical success of any major project is directly related to how well it is linked to the organization's strategic plan. It follows then that information systems implementation must begin and be guided by a thorough understanding of the strategic direction of the organization.
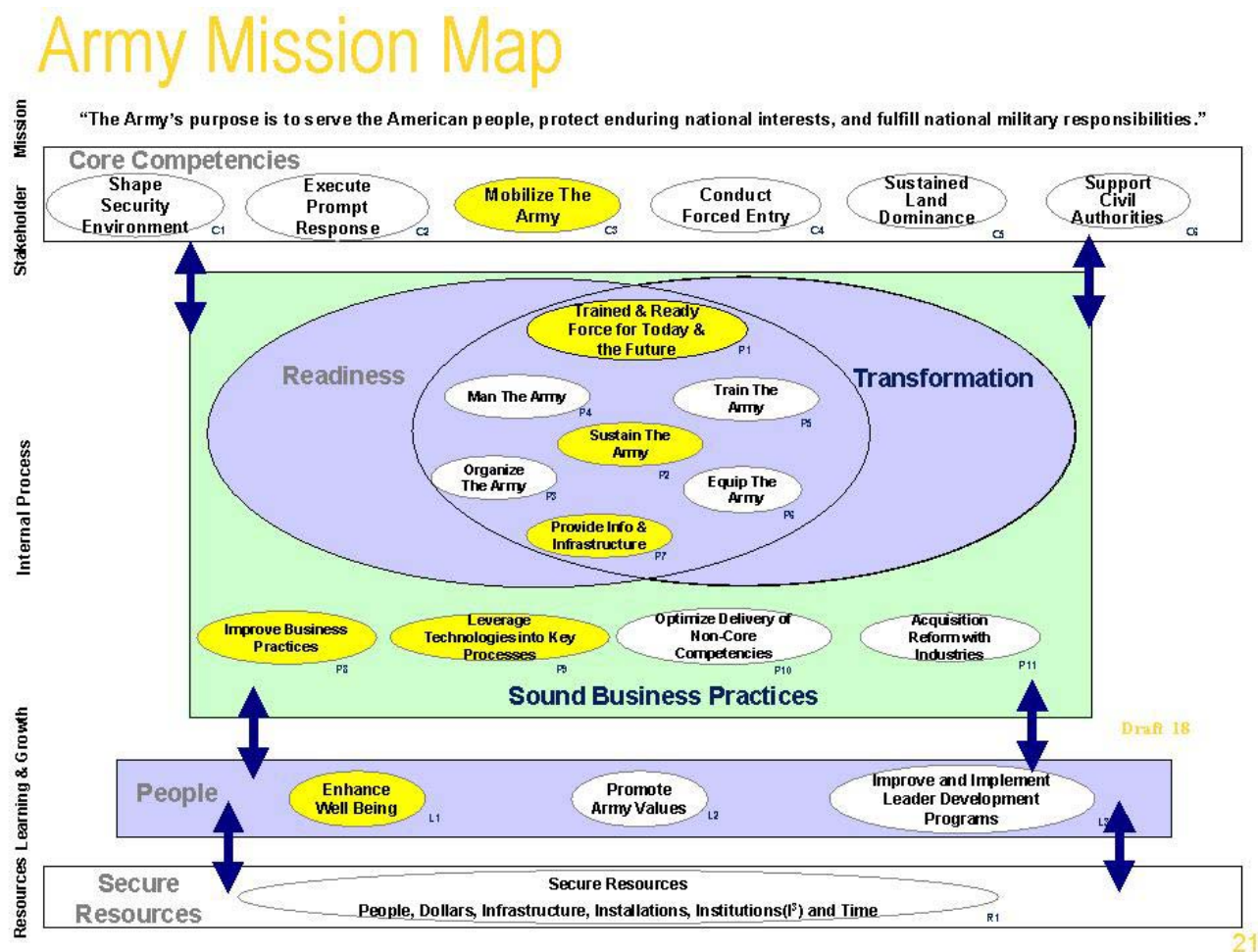
Plan for the entire system life cycle. Thompson;Austin & Boxerman; Whitten & Bentley) discuss that the life cycle must contain the following 5 steps: plan, analyze, design, implement, and maintain. Planning is the step that continues throughout the entire system.

Focus on the user: This critical step is perhaps the most cited success factor in any information system implementation. The need to involve end users in every aspect of the implementation process is the linchpin to success. The literature is replete with examples of problems caused by failure to meet customer needs (Miranda, Fields, & Lund, 2001; Henderson & Deane, 1996; Treister, 1998; Rusin & Willimas; Tayntor, 1993) It is vital to involve the end users throughout the implementation process. Detailed interviews must be conducted that focus on the five W's—who, what, where, when and why (e.g. "who uses the data?" and "where does the data come from? Further, involve the user in both hardware and software selection beginning with the user interface. Regarding hardware, selection of a main frame should start with the hardware that is closest to the customer, then build upon it rather that force-fitting applications into platforms selected by just the information system team.

Neutralize Information System politics: Though failure to meet customer needs ranks high among the reasons for information system project failures, organizational politics is considered to be the biggest threat to successful information system implementation (Overton & Frolick, 1996).
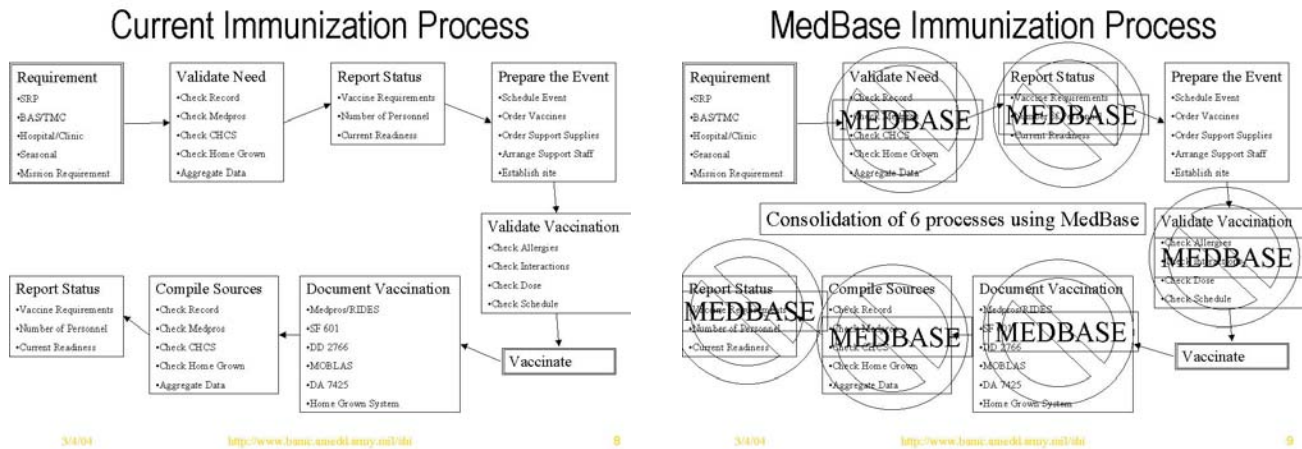
Incorporate quality throughout the process. Rather than treating quality as an afterthought, Rusin and Williams recommend that information system implementers weave aspects of quality throughout the implementation process and ensure that all individuals involved understand its significance towards project success (2001)

2.0 SHORTCOMMINGS OF THE EXISTING SYSTEM:

There is no existing automated information system to integrate and report critical medical information in support of the warfighting commander. Existing medical information systems are focused mainly on vertical information flow within a stovepipe structure in fixed medical facilities. Commanders do not have access to critical medical information that could assist them in planning operations and making decisions regarding shaping the battle space and sustaining the force. An automated medical information system is required to link, both horizontally and vertically, the health care provider with diagnostic systems, automated treatment capabilities, evacuation platforms, other health care providers, and warfighter C2 in order to clear the battlefield and report complete situational awareness for the commander. Health care personnel at all echelons must be able to communicate with each other by audio, video, and electronic media to provide the commander with required medical information.

Specific shortcomings include, but are not limited to the following.

(1)   There are inadequate automated medical C4I systems to support warfighter planning and decision making.

(2)   The CHS systems are manual at brigade, battalion, and company level. Manual information systems do not interface with emerging warfighter digital systems. Manual systems cannot support Force XXI command requirements for timely CHS information. Without timely CHS information, commanders cannot influence operations. The shortfalls and inadequacies (particularly in information exchange capabilities) of current manual information systems are exacerbated in combat and Stability and Support Operations (SASO) environments which increasingly require rapid and frequent mobility. Manual record keeping systems do not comply with Presidential and Congressional directives for soldier monitoring and health documentation.

(3)   There is no interoperability between existing medical systems to enhance timely, efficient medical treatment.

(4)   There are no deployable automated clinical information systems to support the warfighting commander through the entire spectrum of split-base military operations.

(5)   There is no patient movement tracking system in the theater to provide the commander information about the location and status of his soldiers who have become casualties.

(6)   There are no automated systems to document intra-theater immunizations, treatment, and health hazard exposures. This information is important in providing the commander with information regarding the medical readiness of his unit.

(7)   There is no automated medical logistics information systems at corps and below to expedite the resupply of medical supplies to forward areas and decrease the medical logistics footprint on the battlefield by eliminating stockpiles of medical supplies.

3.0 Scope

Table 1: MEDBASE System Impact Across the Battlefield Operating Systems (BOS)

Army BOS / MEDBASE System Impact	Interoperability	Combat Readiness	Decision Making	Synchronization	Mental Agility	Clearing the battlefield	Maneuver	Visibility	Logistics	OPTEMPO	Integrated Info	Medical Anchor Desk	Rapid NBC assessment	Project, protect, sustain the force	Information Dominance	Shape battlespace	Conduct decisive Ops
Intelligence	X	X									X		X		X	X	X
Maneuver		X				X	X			X							
Fire Support		X															
Air Defense		X															
Mobility & Survivability		X	X	X	X	X	X	X		X			X	X	X	X	X
Combat Service Support	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
C2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

The MedBase system will significantly improve the Force XXI commander's ability to:

(a)   Rapidly deploy a healthy and fit force by reducing deployment processing time to minutes rather than hours or days by providing automated tools for the purpose of recording, reporting, and then validating medical deployment readiness.

(b)   Reduce combat mortality and morbidity by providing CHS personnel with a wealth of indexed electronic medical reference necessary to respond to the sick and wounded. Studies indicate that approximately 30% of those who are KIA have the potential of being saved through rapid, technically qualified intervention.

(c)   Account for wounded/injured soldiers while in the CHS system through an automated in-transit visibility interface between the CHS system and the personnel system.

(d)   Synchronize the CHS effort with the overall CSS effort by providing near real time digital CHS information on the 10 CHS functional areas through Global Combat Support System-Army (GCSS-A) or directly to CSSCS.

(e)   Provide force health protection through trend analysis of health care encounters (diagnoses) and improved environmental and occupational health surveillance by providing command surgeons and preventive medicine experts with immediate digital access to this information.

(f)   Provide commanders and medical officers the necessary medical training information necessary to support operations. This includes but not limited to mandatory life saver training for 91W to unit medical training such as Combat Lifesavers. In order to ensure the maximum qualified skill set on the battlefield, MedBase will track and report the status of necessary medical skills on the battlefield at an individual level and unit. MedBase will also assist planners to find the necessary skills for an operation. For example, find professional fillers who have tropical medicine training necessary for a deployment in the pacific basin.

(g)   Transition to a joint environment due to the standardization of CHS business practices and capabilities, as well as streamlined flow of relevant medical information between the Services.

(h)   The MedBase system also sets the foundation for CHS of Strike Force and Army, 2010 and beyond. The concepts outlined in this document are absolutely essential to the successful execution of the basic tenets of Army, 2010 and beyond and Strike Force warfighting concepts because of their dependence on Force XXI concepts as a foundation. As the Army moves to the future, regardless of the concept, as long as soldiers are involved, the CHS basic functions must still be accomplished. The 10 CHS functions include: Medical Command, Control, Communications, Computers and Intelligence (C4I); Medical Logistics and Blood Management; Preventive Medicine; Veterinary/Food Inspection Services; Laboratory Support/Environmental Hazards Testing; Hospitalization; Forward Casualty Resuscitation and Treatment/Area Support; Dental Health; Medical Evacuation; and Combat Stress Control support. Assured telecommunications and digital tools provide a reach back capability and development of a more streamlined/tailored approach to deployment of CHS personnel.

MAJOR PROJECT OBJECTIVES
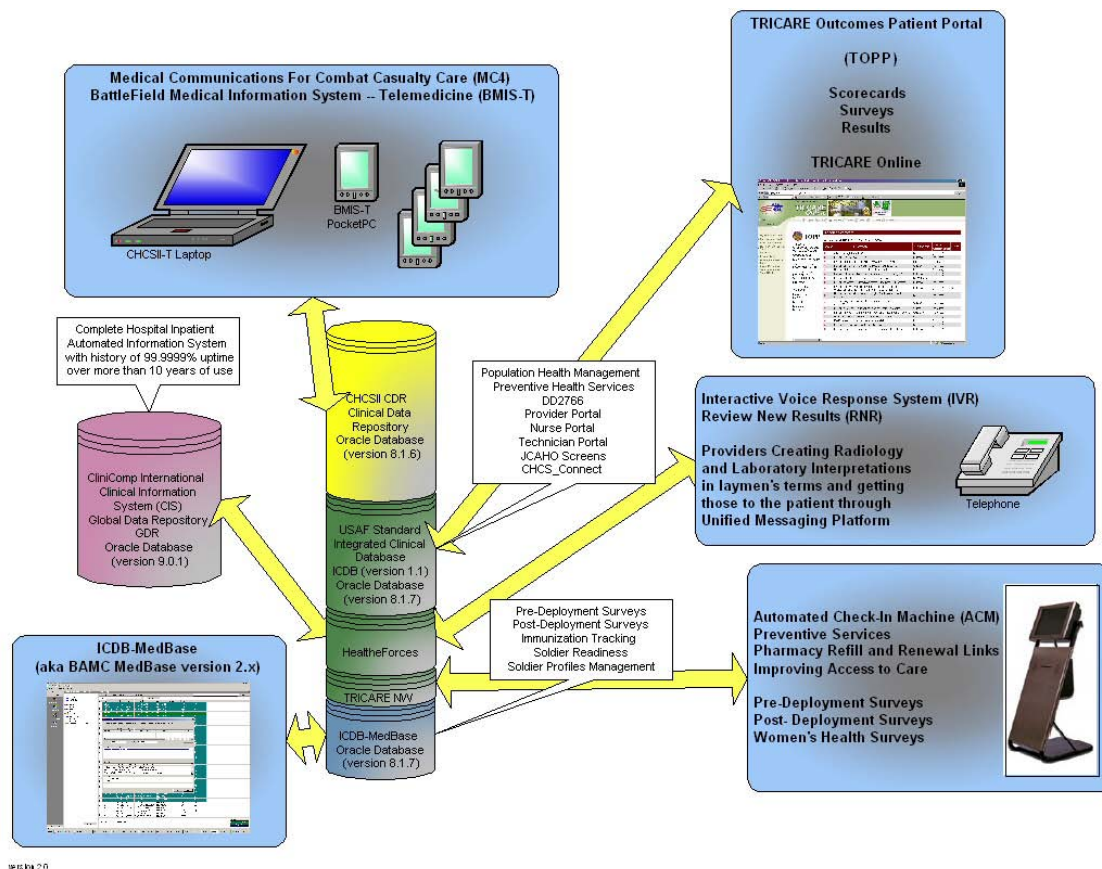
An information system such as the MEDBASE system helps build the build the bridge to the objective CHS system to links commanders, health care providers, and medical support providers, at all echelons, with integrated medical information. The system provides digital enablers to connect, both vertically and horizontally, all ten CHS functional areas. The MEDBASE system receives, stores, processes, transmits, and reports medical command and control, medical surveillance, casualty movement/tracking, medical treatment, medical situational awareness, and MEDLOG data across all levels of care. The MEDBASE system will be developed incrementally through the rapid prototyping and the spiral development process, which will progress the system from limited functional threshold capabilities to fully integrated objective capabilities. Objectives of this system include:

1. Rapidly deploy a healthy and fit force by reducing deployment processing time to minutes rather than hours or days by providing automated tools for the purpose of recording, reporting, and then validating medical deployment readiness.
2. Reduce combat mortality and morbidity by providing CHS personnel with a wealth of indexed electronic medical reference necessary to respond to the sick and wounded. Studies indicate that approximately 30% of those who are KIA have the potential of being saved through rapid, technically qualified intervention.

3. Account for wounded/injured soldiers while in the CHS system through an automated in-transit visibility interface between the CHS system and the personnel system.
4. Provide force health protection through trend analysis of health care encounters (diagnoses) and improved environmental and occupational health surveillance by providing command surgeons and preventive medicine experts with immediate digital access to this information.
5. Provide commanders and medical officers the necessary medical training information necessary to support operations. This includes but not limited to mandatory life saver training for 91W to unit medical training such as Combat Lifesavers. In order to ensure the maximum qualified skill set on the battlefield, MedBase will track and report the status of necessary medical skills on the battlefield at an individual level and unit. MedBase will also assist planners to find the necessary skills for an operation. For example, find professional fillers who have tropical medicine training necessary for a deployment in the pacific basin.
6. Transition to a joint environment due to the standardization of CHS business practices and capabilities, as well as streamlined flow of relevant medical information between the Services.
7. Provide commanders, down to the company level, access to real-time critical medical information, such as temporary medical profiling (disability) and MEB status
8. Reduce deployment processing time by creating automated medical reports that produce efficient medical processing to include required immunizations, prescription drug needs and eyewear
9. Provide commanders the tools for increased force health protection through trend analysis of health care encounters for injury tracking
10. Integrate data from current, standalone information systems (CHCS/ MEDPROS/ MOBLAS) by packaging the data in an easy to use format (Blur the lines of TOE & TDA medical practice).Cross multiple information system domains (MTF to BAS, garrison to field)
11. Reduce data entry requirements throughout the healthcare continuum by taking information gathered at the point of care and using it to feed administrative and readiness databases
12. Provide a continuum of care by sharing data with VA through their VISTA system

   MedBase is a performance-oriented system designed to assist health care professionals and technicians at the point of care. It is designed to integrate with multiple systems ranging from clinical to administrative. It's flexibility, customizability, scalability and overall performance is unparalleled. It was designed to accommodate a variety of connectivity scenarios. One can easily connect using Terminal Services, Terminal Service Web and lastly operate totally disconnected from the network.

Clinical	Administrative	Readiness
• Electronic Clinical Note • Health Care Templates • Population Health • DD 2766 (modified) • DNBI/BI • Health Care Alerts • Rad Imaging (Web) • Immunizations/Injectables • Medical Coding • Disease Manager • Patient Manager • Patient Education • Health References • CHCS Terminal • ICDB (integrated)	• Command Module (bars, flags, sick call, profiles etc) • Email Report Subscription Patient & Provider Profiling • HEDIS • Unit & Medical Training • Basic Personnel Management • Software Development Kit • Bed Manager Personal/Clinic Profiles • Ad Hoc Reports P/PHDA transfer to AMSA • Bi-directional transfer with MEDPROS • Disconnect from Network • Save record to media • Attach various files • Exports (ie PDF) • Patient Tracker	• DD 3349 (Profiles) • DD 2795 (Pre Deployment) • DD 2796 (Post Deployment) • DA 7425 (SRP checklist) • DD 2766 (modified) • DA 3180 PRP • DA 4180 (Flight) • Depleted Uranium • IMR • Medical Training • Readiness Reports • Immunizations • Medical Boards • PRP Rating/Report

The existing practice for medical readiness was disjointed and primarily paper-based resulting in significant inefficiencies and the inability to capture critical clinical information. Those parts that were automated required multiple entries into separate systems that lacked the ability to communicate with each other. MEDBASE serves as the single point for data entry and collection of medical readiness information correcting many of the problems of the existing system. It automates the entire medical readiness portion of the Soldier Readiness Program to include pre- and post-deployment as well as the Adult Preventive and Chronic Care Flowsheet that serves as the soldier's medical record during deployments.

The first version of MEDBASE consolidated several of the databases and spreadsheets into a single program with an easy to use interface. The program was developed using commercial, off-the-shelf products. Because of its ease of use and greatly expanded functionality as compared to the programs that existed, demand for the information system grew immensely.

Numerous trips and hundreds of hands on training courses for the users of MEDBASE has been necessary to encourage the use and implementation of the information system. The end result of a comprehensive implementation of MEDBASE will ensure that a full range of medical readiness information will be assessable and thereby guarantee healthy fighting force.

Bibliography and References:

Department of Veteran Affairs, (2002). Veteran Benefits Administration Annual Benefits Report Fiscal Year 2001. May 2002.

Fatz, R. (1999). Atlas of Injuries in the U.S. Armed Forces. Supplement to *Military Medicine, 164*(8) p xxi.

Jones, B.H. et al (1999). Atlas of Injuries in the U.S. Armed Forces, Military Medicine Supplment, Vol 164, No 8, pp 4-13.

Linton, S.J., Hellsing, A., & Andersson, D. (1993). A Controlled Study of the Effects of an Early Intervention on Acute Musculoskeletal Pain Problems. Pain, 54,353-359.

Shrey, D.E. (1996). Disability Management in Industry: the new paradigm in injured worker rehabilitation. Disability and Rehabilitation, 18(8):408-414.

Sinclair, S.J., Hogg-Johnson, S., Mondloch, M.V., Sheilds, S.A. (1997). The Effectiveness of an Early Active Intervention Program for Workers with Soft-Tissue Injuries. Spine, 22(24):2919-2931.

Wilson-Hare, L. (1998). Disability Management Reduces Costs and Lost Time. Hospital Employee Health, August, 99-104.

Zigenfus, G.C., Yin, J., Giang, G.M., & Fogarty, W.T. (2000). Effectiveness of Early

Physical Therapy in the Treatment of Acute Low Back Musculoskeletal Disorders. JOEM, 42:35-39.

(a) FM 4-02.17 PREVENTIVE MEDICINE SERVICES, 28 AUG 2000

(b) FM 8-10-16 ARMY MEDICAL INFORMATION OPERATIONS, 03 SEP 1998

(c) FM 8-50 PREVENTION AND MEDICAL MANAGEMENT OF LASER INJURIES, 08 AUG 1990

(d) FM 8-51 COMBAT STRESS CONTROL IN A THEATER OF OPERATIONS TACTICS, TECHNIQUES, AND PROCEDURES, 29 SEP 1994 , CHANGE 1, 30 JAN 98

(e) FM 8-55 PLANNING FOR HEALTH SERVICE SUPPORT, 09 SEP 1994

(f) FM 22-51 LEADER'S MANUAL FOR COMBAT STRESS CONTROL, 29 SEP 1994

(g) AR 40-5, PREVENTIVE MEDICINE, 10/15/90

(h) AR 40-10, HEALTH HAZARD ASSESSMENT PROGRAM IN SUPPORT OF THE ARMY MATERIEL ACQUISITION DECISION PROCESS, 10/1/91

(i) AR 40-25 NUTRITION STANDARDS AND EDUCATION, 6/15/01

(j) AR 40-501   STANDARDS OF MEDICAL FITNESS, 3/28/02

(k) HQDA LTR 40-00-1, ERGONOMICS PROGRAM, 7/14/00

(l) HQDA LTR 40-02-1, ERGONOMICS PROGRAM, 7/14/02

(m) WAC 296-62, Washington State Department of Health

(n) AR 602-2. Manpower and Personnel Integration (MANPRINT) in the System Acquisition Process

(o) 29 CFR 1960.8. Agency responsibilities. (Available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

(p) DODI 6055.1. DOD Safety and Occupational Health (SOH) Program

(q) EO 12196. Occupational Safety and Health Programs for Federal Employees

(r) NIOSH Publication 94-110. Applications Manual for the Revised NIOSH Lifting Equation, U.S. Department of Health and Human Services (DHHS), NIOSH. 1994 . (Available from NIOSH Publications , 4676 Columbia Parkway, Mail Stop C-13, Cincinnati, OH 45226-1998.)

(s) OSHA Publication 3123. Ergonomics Program Management Guidelines for Meatpacking Plants, U.S. Department of Labor, OSHA. 1991. (Available from U.S. Department of Labor, OSHA , 200 Constitution Ave., N.W., N3651, Washington, DC 20210.) =

(t) PL 91-596. Occupational Safety and Health Act of 1970 , as amended (29 USC 651 et seq.) TB MED 503. The Army Industrial Hygiene Program